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(54) Blow moulded container

(57) A blow moulded container is formed by first stretch blow moulding a preform 2 to form an intermediary, Fig. 1. The neck portion 4 and shoulder portion 8 of the intermediary are then severed from the body portion 6 to form a mouth 20. A mouth finish (30) is provided at the mouth 20, for example by welding or adhesive fixing, or by injection moulding, Fig 2 (not shown). This process produces a container the material of which is biaxially oriented even in the region of the mouth, which imparts strength to the material.

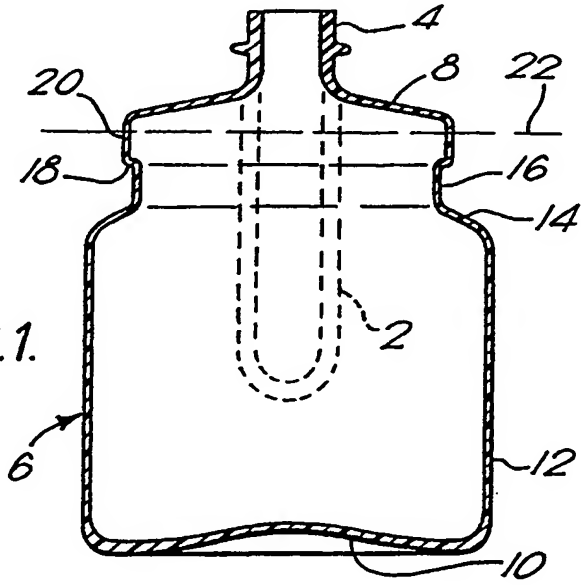

FIG.1.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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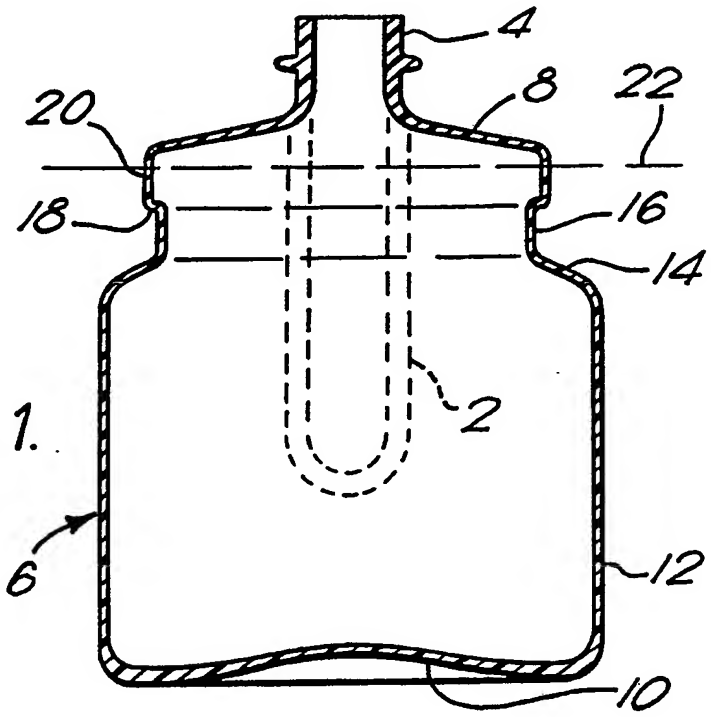

FIG.1.

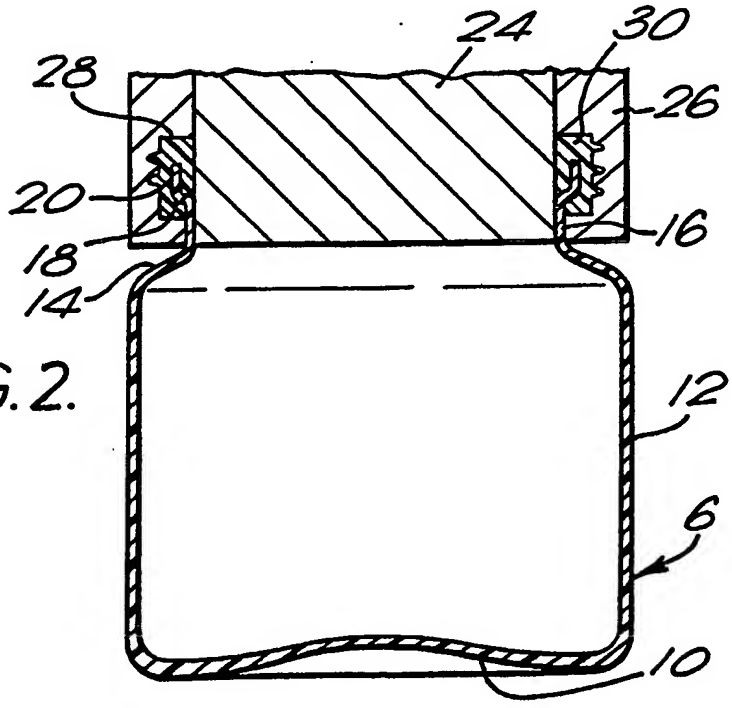

FIG.2.

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BLOW MOULDED CONTAINERS

This invention relates to blow-moulded containers, and is particularly, although not exclusively, concerned with containers having a relatively wide mouth, by comparison with the width of the main body of the container.

It is common for bottles, such as bottles for carbonated soft drinks, to be made from polyethylene terephthalate (PET) by a stretch blow moulding process. A preform, which may be formed by injection moulding, is temperature conditioned and placed in a mould. It is then expanded into contact with the surface of the mould by introducing gas under pressure into the preform and by the action of a stretch rod inserted into the preform. The resulting axial and radial stretching of the preform causes the PET material to become biaxially oriented, which imparts strength to the material.

The neck finish of the finished bottle is formed on the preform, and undergoes no stretching. Similarly, the shoulder region of the bottle, near the neck, undergoes less stretching than the main body of the bottle, and so is not strengthened to the same extent. This difficulty is accentuated when stretch blow moulding wide-mouthed containers.

According to one aspect of the present invention, there is provided a method of manufacturing a container, the method comprising:

a) forming a preform from plastics material;

b) stretch blow-moulding the preform to provide an intermediary comprising a body portion, a neck portion, and a shoulder portion extending between the body portion and the neck portion, in which intermediary the material of the body portion is biaxially oriented and the material of the neck portion is substantially unoriented;

c) severing the neck portion and the shoulder portion from the body portion, thereby forming a mouth on the body portion; and

d) providing a mouth finish at the mouth of the body portion.

According to another aspect of the present invention, there is provided a container comprising a body having a mouth, the body being formed from plastics material which is biaxially oriented, at least in the region adjacent the mouth, a mouth finish being secured to the material of the body adjacent the mouth.

The present invention is particularly, although not exclusively, applicable to wide-mouthed containers. Preferably, where the container is generally cylindrical, the diameter of the container at the mouth is not less than half the maximum diameter of the body of the container. In a preferred embodiment, the diameter at the mouth is approximately 75% of the maximum diameter of the container, but the diameter at the mouth may be equal to, or even greater than, the maximum diameter of the body of the container.

In a preferred embodiment, the mouth finish is made of plastics material and is moulded, for example by injection moulding, directly on to the material of the body. Other methods of fixing the mouth finish to the body may be used; for example, the mouth finish may be welded or adhesively fixed to the body.

A suitable material for the mouth finish is polypropylene, but other materials, for example polycarbonate, may be used. The material of the mouth finish may be the same as the material of the body portion; for example both the body portion and the mouth finish may be made from PET.

Where the container is required to have resistance to heat, for example where it is to be hot filled with a food product such as jam, appropriate measures may be

taken to provide heat resistance by heat setting the PET. For example, the intermediary may be formed in a hot mould which may subsequently be cooled. Alternatively, the intermediary can be transferred from the hot mould to a cold mould in order to accelerate cooling of the intermediary. The absence, in containers formed in accordance with the present invention, of a transition zone between an unstretched neck and a stretched main body enhances the process of heat setting PET.

The intermediary may be formed from PET alone, or from another suitable plastics material. The intermediary may be formed from more than one material, for example by co-injecting the PET with a further material when moulding the preform, or by coating the intermediary with another material. Such measures may be used in order to impart specific desired properties to the body of the container, such as gas or light barrier properties.

The intermediary is preferably shaped so that, when the neck and shoulder portions have been severed, the material around the mouth is shaped in an appropriate manner to receive the mouth finish. For example, the body portion, after severing the neck and shoulder portions, may be provided with a reduced diameter region between the extreme end region of the body portion and the remainder of the body portion. Thus, an inner cylindrical component of an injection mould, which fits closely in the reduced diameter region, will be spaced from the internal surface of the extreme end region. This allows the material of the mouth finish to reach the inner surface of the extreme end region.

For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example,

to the accompanying drawings, in which:

Figure 1 is a sectional view of an intermediary produced during the manufacture of a container; and

Figure 2 shows the container formed from the intermediary of Figure 1, along with a mould for forming part of the container.

The intermediary shown in Figure 1 is made by stretch blow moulding a preform 2 identified in Figure 1 in dotted outline. The preform 2 is made from PET, and is formed by injection moulding. The preform 2 includes a neck finish 4, which remains unchanged in the blow moulding process.

The intermediary is generally in the form of a bottle with a relatively narrow neck. It has a body portion 6, a neck portion constituted by the neck finish 4, and a shoulder portion 8 which interconnects the body portion 6 to the neck portion 4. The body portion 6 comprises a base 10 from which extends a cylindrical wall 12. At the top end of the wall 12 there is a narrow shoulder 14 which connects the wall 12 to a reduced diameter region 16. The region 16 is connected by a small lip 18 to a cylindrical upper region 20 of the body portion 6. The base 10 may be provided with suitable formations, for example it may be fluted, in order to improve its rigidity.

It will be appreciated from Figure 1 that the material of the intermediary has been stretched both axially and radially as the preform 2 expands during the blow moulding process. This stretching causes the material to become biaxially oriented and therefore strengthened. However, it will be appreciated that the shoulder portion 8, or at least the radially inner region of the shoulder portion 8, is stretched much less than the body portion 6, and consequently the orientation, and resulting strength, of the material of the shoulder portion 8 is reduced as compared to the

body portion 6.

The intermediary is divided, or trepanned, along the line 22 so as to sever the shoulder portion 8 and the neck portion 4 from the body portion 6. The trepanned intermediary is then positioned in an injection moulding machine, as shown in Figure 2, which includes a core 24 and a lip plate 26. The core has a cylindrical outer surface with a diameter equal to that of the inner surface of the reduced diameter region 16, so that it is a close fit within the reduced diameter region 16. Alternatively, it could have a somewhat greater diameter, so that it can engage the lip 18. Between them, the core 24 and the lip plate 26 define a mould cavity 28 into which extends the upper end region 20 of the body portion 6. It will be appreciated from Figure 2 that, as a result of the lip 18, the upper end region 20 lies some distance away from the core 24.

Polypropylene is injected into the mould cavity 28 and surrounds the upper end region 20 and the lip 18 to form a mouth finish which, when solidified, is locked firmly onto the body portion 6. The inner diameter of the mouth finish 30 is continuous with the inner surface of the reduced diameter region 16, and its outer surface, as shown, is provided with screw thread formations 32 for receiving a screw cap. The end region 20 may be provided with formations, such as circumferential ribs or grooves, in order to improve the security of the connection between the body and the mouth finish.

If the container is intended for packaging products which will be hot filled (for example jam), the preform 2 can be stretch blow moulded in a hot mould in order to impart heat resistance. If desired, the hot mould could be cooled after the blow moulding process, but before the intermediary is removed from the mould, or the intermediary could be removed from

the hot mould and placed in a cool mould, in order to enhance the heat resistance.

The use of a polypropylene mouth finish over moulded onto a PET body provides satisfactory results because polypropylene provides rigidity and is heat resistant yet has a melting temperature below that of PET.

Containers formed in accordance with the present invention can be transparent and so could be used as a lightweight, damage resistant alternative to glass jars. Also, with appropriate modification of the mouth finish 30, the container could provide an alternative to metal containers such as paint cans.

CLAIMS

1. A method of manufacturing a container, the method comprising:

a) forming a preform from plastics material;

b) stretch blow-moulding the preform to provide an intermediary comprising a body portion, a neck portion, and a shoulder portion extending between the body portion and the neck portion, in which intermediary the material of the body portion is biaxially oriented and the material of the neck portion is substantially unoriented;

c) severing the neck portion and the shoulder portion from the body portion, thereby forming a mouth on the body portion; and

d) providing a mouth finish at the mouth of the body portion.

2. A method as claimed in claim 1 in which the mouth finish is made of plastics material.

3. A method as claimed in claim 1 or 2, in which the mouth finish is moulded directly on to the material of the body.

4. A method as claimed in claim 3, in which the mouth finish is moulded directly on to the material of the body by injection moulding.

5. A method as claimed in claim 1 or 2, in which the mouth finish is welded or adhesively fixed to the body.

6. A method as claimed in any one of the preceding claims in which the material of the mouth finish is the same as the material of the body portion.

7. A method as claimed in claim 6, in which the body portion and the mouth finish are made from polyethylene terephthalate.

8. A method as claimed in any one of claims 1 to 6 in which the material of the mouth finish is polypropylene.

9. A method as claimed in any one of claims 1 to 6, in which the material of the mouth finish is polycarbonate.

10. A method as claimed in any one of the preceding claims, in which, in step (b), the intermediary is formed in a hot mould which is subsequently cooled.

11. A method as claimed in any one of claims 1 to 9, in which, in step (b), the intermediary is formed in a hot mould and is subsequently transferred from the hot mould to a cold mould.

12. A method as claimed in any one of the preceding claims in which the body portions, after severing the neck and shoulder portion, has a reduced diameter region between the extreme end region of the body portion and the remainder of the body portion.

13. A container comprising a body portion having a mouth, the body being formed from plastics material which is biaxially oriented, at least in the region adjacent the mouth, a mouth finish being secured to the material of the body adjacent the mouth.

14. A container as claimed in claim 13 which is a wide-mouthed container.

15. A container as claimed in claim 13 or 14, the container being generally cylindrical, and the diameter of the container at the mouth being not less than half the maximum diameter of the body of the container.

16. A container as claimed in claim 15, in which the diameter of the mouth is approximately 75% of the maximum diameter of the container.

17. A container as claimed in claim 15, in which the diameter at the mouth is equal to, or greater than, the maximum diameter of the body of the container.

18. A method of manufacturing a container, as claimed in claim 1 and substantially as described herein.

19. A container substantially as described herein with reference to, and as shown in, the accompanying drawings.

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